Understanding the non-medical costs of health care: Evidence from inpatient care for older people in China

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Abstract

Non-medical costs can constitute a substantial part of total health care costs, especially for older people. For instance, there are high costs associated with carers, travel, food, and accommodation for family members who accompany and care for older people during their medical visits. This study examined the effects of such non-medical costs on catastrophic health payments and health payment-induced poverty among older people in rural and urban China. Data were drawn from the China Health and Retirement Longitudinal Survey 2015. Results indicated that inpatient costs may account for a significant proportion of all household expenditures and that the non-medical costs can account for approximately 18% of the total inpatient costs. The proportion was highest for those of the lowest wealth groups. Rural populations were more likely to incur catastrophic health payments and suffer from health payment-induced poverty than urban populations. Results also showed that non-medical costs increase the chances of older people incurring catastrophic health payments and suffering from health payment-induced poverty. These effects are more concentrated among the poor. Findings offer implications for policymakers to modify existing policies or develop new policies that facilitate reimbursement of non-medical costs and improve health care systems in general, particularly for the rural populations.

1. Introduction

Non-medical costs can constitute a substantial part of total health care costs, especially for older people. While these costs may be deemed irrelevant from a health care perspective, they may influence the health care provided to older people. Most older people will experience at least one health problem that counts as a disability; many will undergo multiple issues by the time they reach the age of 85 (World Health Organization, 2015). The associated health effects can be profound. There may thus be high costs relating to carers, travel, food, and accommodations for family members who accompany and care for older people during their medical visits.

Notable differences have been observed in the socioeconomic characteristics and health outcomes. These differences are likely to become more pronounced with advanced age as it has been observed that disabilities are often more prevalent in older people belonging to lower socioeconomic groups (Brinda, Kowal et al. 2015). As the poor tend to incur higher opportunity costs than the rich, the impact of non-medical costs (which are often paid out-of-pocket by these individuals) can significantly influence the material living standards of their household (O'Donnell, van Doorslaer et al. 2008). Older people from poorer socioeconomic groups often have difficulties in meeting these costs, thereby worsening existing health inequalities.

This situation may be more problematic for older people residing in rural China, where health facilities are either scarce or of poor quality (Yip, Hsiao et al. 2012, Yip, Wagstaff et al. 2009). Rural farmers are more likely to bypass local practitioners to seek care in urban hospitals, which may increase both medical and non-medical costs (Qiu, Xu et al. 2014). Since differences in wealth can also profoundly influence access to care and affordability, health payment-related problems are particularly acute for rural older people with little wealth, who are already struggling to maintain their livelihoods (Yang, Wu 2014).

This study seeks to examine the effects of non-medical costs on catastrophic health payments and health payment-induced poverty among older people from urban and rural areas in China, where few related empirical studies have been conducted. This study first involved a literature review to identify meaningful and applicable ways of measuring non-medical costs for inpatient care, followed by another literature review on the non-medical costs of patient care for older people and any related implications on inequity. This study derived data from the China Health and Retirement Longitudinal Survey (CHARLS) 2015. The findings of this study offer implications for policymakers to modify existing or develop new policies that facilitate reimbursement of non-medical costs and improve health care systems in general, particularly for the rural populations.

2. Conceptualising non-medical health care costs

There is widespread contention and debate over the definition of non-medical health care costs. As this study examined patient costs borne by the individual, all costs associated with receiving care were considered. Specifically, this study examined the three main categories of non-medical costs presented below.

Category 1. *Costs of productivity losses.* The value of potentially lost productivity often stems from short or long-term absences from work as a consequence of mortality and morbidity (Knapp 1997). Although many health and illness studies have tended to ignore or underestimate the costs associated with productivity losses, some of the largest non-medical costs arise from working time lost as a result of illness. These costs are often significantly higher for older people when compared to the general population(Costa-Font, Courbage 2012). Methods of accounting for the costs related to productivity losses have traditionally either been derived from the potential value of foregone earnings as a result of illness or by considering the estimated elasticity for labour time versus labour productivity (Koopmanschap, Rutten 1996). The latter method requires information on elasticity, which may vary substantially across occupations and sectors and is often difficult to obtain. This

study therefore estimated productivity losses due to lost earnings, which were evident through the data.

Category 2. *Carer costs.* Carer support comprises a significant part of the total health care provided to older people, especially in situations of chronic illness (de Meijer, Brouwer et al. 2010). The care given to older people usually involves a mixed support network consisting of hospital assistance in addition to paid and unpaid carers. If care is provided at the expense of paid labour, then any analysis should account for the carer's labour costs. If care is voluntarily delivered by informal unpaid family carers, then such unpaid work imposes additional costs through individual household expenditures, travel, and food expenses or lost earnings, but not out-of-pocket payments. Opportunity costs can also be incurred by informal carers. However, these are often difficult to accurately assess and were thus not included in this analysis (de Meijer, Brouwer et al. 2010, Dixon, Walker et al. 2006).

Category 3. *Travel, accommodations, and food costs.* It can be complex and/or costly to travel to health care facilities in places where health services are geographically distant or there is poor access to public transportation. This means there are additional costs associated with travel, accommodations, and food for family members who accompany older patients while they visit these facilities. These expenses were also considered in this analysis.

3. Non-medical health care costs for older people and the associated implications on equity

Most empirical studies on health and illness have focused on a narrow range of health services. However, a few studies that exclusively dealt with older people recognised the importance of including non-medical or societal costs in their analyses. For instance, Sven et al. (2008) examined primary care service utilisation and costs among older people aged 75 and above in Germany, and identified that costs associated with carers, assisted living, and transportation constituted approximately 18% of the total patient care costs. Research has also indicated that the costs associated with nursing, community care, and domiciliary care, which

involve personal care, significantly contribute to the overall patient costs for older people with cognitive impairments (Herrmann, Lanctot et al. 2006, Rockwood, Brown et al. 2002, Wimo, Guerchet et al. 2017, Yang, Lin et al. 2013). For example, informal and social care costs can contribute up to 40% of the total costs for dementia patients in high-income countries, while the direct health costs tend to be much lower. Informal care also accounts for the majority of the total costs in low- and middle-income countries (Wimo, Guerchet et al. 2017).

Few studies have explicitly measured the extent to which non-medical costs vary according to socioeconomic status. A Danish study compared the costs incurred by patients suffering from psoriatic arthritis (PsA) (a common chronic inflammatory skin disorder among older people) with the healthy population and found that patients with PsA had higher total health care costs and had spent an average of €10,641 per patient on non-medical costs. They were also more likely to be unemployed, disabled, and experience comorbidities (Kristensen, Jorgensen et al. 2017). Scholars have also argued that poor older people are exposed to increased cardiovascular risk factors and may incur higher costs compared to those with greater financial means; this situation is worse for those in developing countries (Prince, Wu et al. 2015).

There has been particularly little research on patient care costs among older people in China, despite the increasing importance of this topic for policymakers. In China, large geographical variations exist in terms of health care provider availability. In the vast rural areas, where the number and quality of health care facilities are lower than those in urban areas, many older people may need to travel to a city to see a specialist, which often involves high non-medical costs. While these expenses may be affordable for some, they may be significantly deterrent to those belonging to lower socioeconomic groups (Peng 2017). For instance, Zeng et al. (2012) investigated the utilisation and cost of health care based on the demographic characteristics of older people from 22 provinces in China. Results indicated that females who

were disabled and without children were more likely to incur high health and social care costs. Scholars have also argued that patient costs usually account for a significant proportion of household expenditures and tend to be higher for older people with chronic illnesses (Wu, Lei et al. 2012, Qiu, Xu et al. 2014).

4. Methods

4.1 Data source and study sample

We use China Health and Retirement Longitudinal Survey (CHARLS) 2015. Using a multi-stage sampling process, the CHARLS 2015 interviewed households comprising persons aged 45 and above from 28 provinces/autonomous regions. The CHARLS was designed to investigate issues related to demographic characteristics, socioeconomic status, and health-related factors. It also contained questions on health service utilisation, insurance coverage, health providers, and health facilities in addition to items concerning the service accessibility, travel costs, and the perceived quality of care.

This study primarily focused on investigating the impact of non-medical costs among older people. We included both urban and rural samples for individuals aged 60 year and above in this analysis. In comparing the level of catastrophe and health payment-induced poverty for rural and urban populations, all empirical analyse were conducted among the whole (N = 5,329), rural (N = 4,038), and urban (N = 1,291) populations. Cross-sectional individual weights were adjusted according to the individual and household non-responses were applied to all descriptive analyses.

4.2 Variable specifications

Table 1 provides a statistical summary and variable specifications. Two categories of inpatient cost variables were distinguished in this analysis. The first category was inpatient out-of-pocket (OOP) health costs, which were defined as the inpatient costs paid to hospitals after insurance reimbursement. Interviewees were first asked if they had received inpatient

care within 12 months prior to the survey. If answering yes, respondents were then asked to recall their most recent inpatient visit, as follows: '*How much did you or will you eventually pay out of pocket to the hospital for your hospitalisation*?' The second cost category included inpatient OOP health costs plus non-medical costs. Respondents were also asked to report on the two following items: '*The total costs of hired carers*' and '*the total costs for transportation, food, and accommodation for yourself and relatives*'. After adding the costs associated with productivity losses—these costs were calculated based on the number of days respondents were absent from work because of inpatient visits multiplied by the individual's daily income, the resulting number constituted non-medical costs. All outliers in the inpatient OOP health costs measurement (i.e. the top and bottom 0.5% of all cases) were removed from this analysis (Wagstaff, Lindelow 2008). Per capita household expenditures were used as a measurement of living standards and were adjusted according to household size using the Equivalence Scale method (Yang, Wu 2014). The statistical summary also indicated that rural respondents were considerably poorer, less educated, and less healthy when compared to urban respondents. Table 1 shows variable specifications and descriptive statistics for a set of health needs and socioeconomic variables.

<Table 1 about here>

4.3 Empirical strategies

(a) Measuring catastrophic health payments

In this study, catastrophe is defined as the catastrophic health payments that occur when health costs exceed 40% of the household per capita expenditures (net of food expenditures). This definition was introduced by the World Health Organization and has been used in many studies (O'Donnell, van Doorslaer et al. 2008, Xu, Evans et al. 2003). It is visualized as follows:

(1) $$H_k = \frac{\sum_{i=1}^{N} x_{ik}}{N}$$

Where H is catastrophic headcount (the proportion of older people who fall below the catastrophic thresholds), i denotes each observation in the sample (N), $x_i = 1$ if $\frac{Q_{ik}}{T_i} > z$ (the ratio of inpatient cost (Q_{ik}) as accounted for the household per capita expenditure (T_i) exceeds the 40% threshold (z)), 0 otherwise. Q denotes k different categories of inpatient costs (k = inpatient total health costs, inpatient total health costs plus indirect costs, inpatient OOP health costs, and inpatient OOP health costs plus indirect costs).

The intensity of the payment (overshoot) was measured by the average amount exceeding the catastrophic threshold, as follows:

(2) $$O_k = \frac{\sum_{i=1}^{N} x_{ik}(\frac{Q_{ik}}{T_i} - z)}{N}$$

Mean Positive Overshoot (MPO) is defined as intensity divided by headcount, as follows:

(3) $$MPO_k = \frac{O_k}{H_k}$$

The measures of catastrophic headcount and overshoot required consideration of the distributions of these estimates across income groups. This is because the opportunity costs for the poor are usually greater than those for the rich (O'Donnell, van Doorslaer et al. 2008). Both measures can be adjusted using the method of Concentration Indices. For catastrophic headcount measures, Erregyers's Concentration Indices were used because the binary nature of the variable formally called for a non-linear measure (Erreygers 2009). Catastrophic overshoot was measured using the Concentration Indices introduced by O'Donnell et al.

(O'Donnell, van Doorslaer et al. 2008). These Indices indicate the distribution of the catastrophic headcount (C^h) and gap (C^o) relative to household income, as follows:

(4) $H_k^w = H_k(1-C_k^h)$

(5) $O_k^w = O_k(1-C_k^o)$

Where H_k^w denotes the weighted headcount for inpatient cost category *k*, and C_k^h denotes Erregyers's Concentration Index for the catastrophic headcount, O_k^w represents the weighted overshoot and C_k^o represents the Concentration Index for weighted overshoot. This equation is equivalent to a weighted sum of a catastrophic headcount or an overshoot variable by multiplying weights declining linearly from 2 to 0 as the household ranks from poorest to richest. Here, poor households were likely to receive more weight (i.e. if those exceeding the catastrophic threshold tended to be poor).

(b) Health payment-induced poverty

The extent to which health costs impact household material living standards can also be estimated by examining health payment-induced poverty. This study followed the method introduced by O'Donnell and van Doorslaer (2008), wherein incidence and severity of health payment-induced poverty are compared as the two patient cost variables. Incidence was measured according to the number of people who fall below the poverty line because of health payments (i.e. headcount), while intensity was measured according to the amount by which a household falls below the poverty line because of health payments (i.e. gap). This study used two poverty thresholds (i.e. the international poverty line of US$ 1.9 per person per day (World Bank, 2015) and the Chinese National Poverty Line (NPL), which, as of 2016, was a net per capita income of ¥2,300 per year (US$ 0.95 per day)) (National Bureau of Statistics of P.R.China 2015).

This study also plotted a revised version of Pen's parade (Pen 1977), which is defined as 'a succession of every person in the economy, with their height proportional to their income, and

ordered from lowest to greatest'(Pen 1977, Pen 1972). In this case, a parade is plotted using household expenditures per capita gross of any health costs on the y-axis against the cumulative proportion of the population ranked by the expenditures on the x-axis. This study plotted two additional parades by using household expenditures per capita net of inpatient OOP costs and inpatient OOP costs plus indirect costs, respectively, against the cumulative proportion of the population ranked by each of these expenditure variables. The poverty lines were then plotted along the y-axis to show the proportion of households that had been pushed below the poverty line because of inpatient costs. A detailed explanation of how Pen's Parade is used in health payment-induced poverty can be found in work by O' Donnel et al. (2008).

4.4 Robustness checks

Two sets of robustness checks were conducted to determine whether non-medical costs had any significant effects on catastrophic health payments and health payment-induced poverty. Separate analyses were run for the entire sample (i.e. rural and urban populations) in the first set of checks. An additional analysis for older people with chronic illnesses to determine whether non-medical costs resulted in a greater burden for that population was also performed. No significant differences were found when compared to the entire population. The second set of robustness checks can be found in the appendix.

5. **Results**

Table 2 shows average per episode health costs as a share of household per capita expenditures by quintiles. Inpatient costs were measured in two different categories to show the differences that arose when including and excluding indirect costs in the measures. The first category was inpatient OOP costs, while the second was inpatient OOP costs plus non-medical costs (i.e. transportation costs, accommodation costs for family members, and carer costs). Results showed that health costs, as a share of household per capita expenditures, were highest for the poorest households. In addition, the share for the poorest households was more than three times that of the richest households. For instance, inpatient OOP costs accounted

for 10.82% of household per capita expenditures for the poorest households, but only 3.02% for the richest households. The share of inpatient OOP costs increased to 12.75% for the poorest households and 3.56% for the richest households when non-medical costs were considered. Looking at the rural and urban populations, it is evident that rural populations (especially those from the poorest and second-poorest groups) spend a significantly higher proportion of their total household incomes on inpatient care as compared to urban populations. The relative differences between the richest and poorest household in terms of the share of inpatient costs was approximately three times higher for the rural, whereas it was less than two times higher for the urban.

<Table 2 about here>

Table 3 shows the inpatient costs and related non-medical costs for all samples and samples with inpatient visits. For all samples, the average inpatient OOP cost was ¥801.27, whereas non-medical costs for transportation, meals, and accommodation for family members amounted to ¥146.6. That is, 18% higher than the inpatient OOP costs. These findings also show that older people from urban areas tend to spend more on inpatient care as compared to those from rural areas.

<Table 3 about here>

Table 4 shows the incidence and intensity of catastrophic inpatient health payments according to different cost categories using the threshold level of 40% of per capita household expenditures (net of food expenditures). The incidence and severity of catastrophes increased when non-medical costs were considered. For the whole population (before any non-medical costs were included), 2.58% (N = 150) of older people fell below the threshold level. This percentage increased to 3.00% (N = 175) if only considering non-medical costs. The difference was 17% and statistically significant at the 0.01 level. Similarly, catastrophic

overshoot significantly increased (i.e. to 25.42% ($p < 0.01$)) when comparing inpatient OOP costs with inpatient OOP costs plus non-medical costs. The same result held for the headcount measure.

Notably, older people from urban areas were significantly less likely to fall below the catastrophic thresholds (i.e. 3.28% of rural populations fell below the catastrophic threshold, whereas the percentage was only 1.95% for urban populations). Similar results were found for overshoot and MPO.

All CIs for headcount and overshoot were pro-poor, meaning that catastrophe was more likely to occur among poor households than rich ones. The CIs for overshoot were high, thus indicating the existence of pronounced pro-poor inequities in the intensity of catastrophic inpatient costs. MPO indicated the overshoot for those that had inpatient visits. Inpatient OOP health costs were 76.78% higher than the threshold level, and were 86.54% more when non-medical costs were included for the entire population.

<Table 4 about here>

Table 5 shows the results for health payment-induced poverty using the NPL (¥2,300 per year) and the international poverty line ($US1.9). Using the World Bank poverty line, our results indicated that approximately 14.04% of all older people fell below the poverty line before any inpatient costs were considered. However, the percentages increased to 15.02% and 15.28% when inpatient health costs and non-medical costs were considered, respectively. The poverty gap was ¥277.6 below the poverty line before any health costs were considered. This gap increased to ¥400.2 when inpatient health costs were added to the analysis. There was a further increase to ¥436.9 when both health costs and non-medical costs were added. Similar results were found in the OOP patient costs category and when using the NPL. All differences were statistically significant.

Results unsurprisingly indicated that rural populations were more likely to fall below the poverty than urban populations as a result of inpatient OOP costs. However, urban populations were more likely to fall below the poverty line due to non-medical costs. In particular, 1.22% of all rural populations fell below the World Bank poverty line as a result of non-medical costs (the percentage was 5.8% for urban populations).

<Table 5 about here>

Figures 1 and 2 show Pen's Parade results for household expenditures per capita for the poorest 20% using both the World Bank PL and the NPL for urban and rural populations, respectively. Figure 1 shows five lines indicating gross and net household expenditures per capita for different inpatient cost categories for rural populations. The X axis indicates the cumulative percentage of the population ranked by household expenditures per capita gross and net of inpatient cost categories, while the Y axis indicates household expenditures per capita. The black line indicates household per capita expenditures gross of any health costs. The solid and dotted blue lines indicate household per capita expenditures net of inpatient OOP costs (i.e. net of inpatient OOP costs plus indirect costs). As a result of inpatient costs, urban populations were less likely to fall below the poverty line than rural populations (Figures 1 and 2; Table 5). However, there was also a higher probability that urban populations would become poor after incurring non-medical costs.

<Figure 1 about here>

<Figure 2 about here>

6. Discussion and conclusions

Although China has made remarkable achievements in strengthening its health services, this study suggests that increased efforts are needed to reduce the financial burden of health costs for poor older people, many of whom are failing to seek medical treatment or are falling below the poverty line as a result of both medical and non-medical costs. This study is among the first to investigate the effects of inpatient care costs on catastrophic health payments and health payment-induced poverty for older people by incorporating non-medical costs into its analysis. Findings suggest that inpatient costs account for a significant portion of household expenditures among older people. Here, non-medical costs may account for approximately 18%. The share is highest for those in the lowest wealth groups. Results also indicate that rural populations are more likely than urban populations to incur catastrophic health payments and suffer from health payment-induced poverty. Non-medical costs also increase the chances that older people will be affected by both these problems. These effects are more concentrated among rural and poor populations.

This paper offers three related policy implications. First, the non-medical costs associated with receiving health care can present difficulties for many older patients; the government quickly needs to recognise this. For instance, travel costs can be especially expensive when patients are required to complete complex and lengthy journeys from rural villages to tertiary hospitals in urban areas. Further, some older patients may require escorts or carers to accompany them in this context. These individuals should have the option to claim these costs. Some developed countries have already implemented health care travel-cost programmes to help vulnerable groups cover these expenses. For instance, the National Health Service in England reimburses travel and associated costs for low-income patients if they are referred to hospitals or other health facilities for specialist treatment or diagnostic testing (NHS 2017). Similar measures should be considered by the Chinese government. It is also worth pointing out that poor patients seeking care in urban areas may incur particularly high and burdensome costs related to non-medical items (e.g. carers, productivity losses, and others).

Second, the government needs to address the issue of high health care costs. Here, stress is particularly apparent throughout the nation's vast rural villages, in which 65% of older people live below the poverty line (Hatton 2015). Although the New Cooperative Medical Scheme reaches nearly all of China's rural population, the benefits package is rather basic and only covers a narrow range of conditions (Yang 2013). Thus, more comprehensive coverage with higher reimbursement rates for health services should be introduced so that access to care can be improved for older people living in rural areas (Yang 2013, Yip, Hsiao et al. 2012, Yip, Hsiao 2009).

Finally, there should be special emphasis on the need for long-term care (LTC) while enhancing coordinated and more continuous care for older patients, who are suffering from chronic diseases at an increasing rate. International precedent indicates that services of this type also reduce unnecessary use of and spending on acute health services while helping families avoid catastrophic health payments (World Health Organisation 2018).

This study has some limitations. First, the costs associated with health deterioration subsequent to inpatient episodes were not evident through the dataset. These costs were therefore not reflected in the findings. Second, this study mainly relied on self-reported data, which may cause bias in the analysis because of inaccurate recall or misreporting (Wooldridge 2012). However, most studies that use data from individual surveys operate with this limitation. Third, approximately 5.71% of those observed in our sample stated that they had forgone treatments. A higher percentage of people having catastrophic health payments or falling below the poverty line can be anticipated if included in the analysis. However, it is difficult to know how the results would have been affected in this scenario. Future study is thus needed to address the methodological omissions of this analysis.

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Table 1. Summary statistics

Variable	Whole population (N = 5,329)		Rural population (N = 4,038)		Urban population (N = 1,291)	
	Mean	**Std. Dev.**	**Mean**	**Std. Dev.**	**Mean**	**Std. Dev.**
Age	68.994	6.984	68.766	6.970	69.463	6.993
Sex	0.558	0.497	0.548	0.498	0.579	0.494
Self-assessed health						
Excellent health	0.095	0.294	0.091	0.287	0.105	0.307
Good health	0.114	0.318	0.098	0.297	0.148	0.355
Average health	0.491	0.500	0.455	0.498	0.565	0.496
Poor health	0.228	0.420	0.273	0.446	0.136	0.343
Very poor health	0.071	0.257	0.083	0.277	0.046	0.211
Has chronic disease(s)	0.996	0.059	0.997	0.055	0.994	0.077
Productivity losses (number of days)	11.952	11.797	11.172	12.169	13.246	12.271
Household expenditures per capita	32281.680	47299.130	24531.700	39528.180	48501.130	56278.700
Urban residents	0.321	0.467	0.000	0.000	1.000	0.000
Lives alone	0.182	0.386	0.202	0.402	0.140	0.348
Education level						
No education	0.277	0.447	0.359	0.480	0.100	0.301
Elementary school education	0.449	0.497	0.506	0.500	0.327	0.469
Middle school education	0.156	0.363	0.110	0.313	0.254	0.435
High school education and above	0.119	0.324	0.025	0.156	0.319	0.466

Table 2. Inpatient costs as shares of household income (net food expenditures)

	Whole population (N = 5,329)		Rural population (N = 4,038)		Urban population (N = 1,291)	
	Inpatient OOP costs	**Inpatient OOP costs + non-medical costs**	**Inpatient OOP costs**	**Inpatient OOP costs + non-medical costs**	**Inpatient OOP costs**	**Inpatient OOP costs + non-medical costs**
Poorest(Q1)	10.82%	12.75%	10.69%	12.86%	5.80%	6.05%
2nd quintile	3.73%	4.26%	5.33%	6.05%	4.36%	4.95%
3rd quintile	3.38%	4.18%	3.46%	4.34%	1.69%	1.99%
4th quintile	3.06%	3.52%	2.98%	3.46%	2.16%	2.47%
Richest (Q5)	3.02%	3.56%	3.23%	3.84%	2.92%	3.73%
Ratio(Q1/Q5)	3.58	3.58	3.31	3.35	1.99	1.62

Table 3. Health care cost categories in Chinese Yuan units

	Whole population (N = 5329)		Rural population (N = 4038)		Urban population (N = 1291)	
Medical costs	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Inpatient OOP costs (a)	801.27	6105.60	708.65	6147.69	1090.97	5965.08
Inpatient OOP costs + non-medical costs (b)	947.83	6743.24	835.28	6492.82	1299.85	7464.28
Difference	18.29%		17.87%		19.15%	
Non-medical costs	**Mean**	**S.D.**	**Mean**	**S.D.**	**Mean**	**S.D.**
Productivity loss	4.28	58.05	3.51	52.61	6.71	72.44
Transportation + food + accommodation	141.07	1694.67	128.05	1083.63	181.81	2860.87
Carer	19.67	657.28	16.17	674.45	30.62	600.53

Table 4. Catastrophic health payments for different inpatient cost categories

			Whole population (N = 5,329)			Rural population (N = 4,038)			Urban population (N = 1,291)		
			Inpatient OOP costs	**Inpatient OOP costs + non-medical costs**	**Relative difference**	**Inpatient OOP costs**	**Inpatient OOP costs + non-medical costs**	**Relative difference**	**Inpatient OOP costs**	**Inpatient OOP costs + non-medical costs**	**Relative difference**
			(a)	(b)	((b)-(a))/(a)	(a)	(b)	((b)-(a))/(a)	(a)	(b)	((b)-(a))/(a)
Headcount	**Headcount (%)**	Mean	2.58%	3.00%	16.67%***	2.81%	3.28%	16.81%***	1.72%	1.95%	13.64%*
		S.E.	0.002	0.002		0.003	0.003		0.004	0.004	
	CI	Mean	-0.020	-0.020	2.85%***	-0.014	-0.013	-7.82%***	-0.023	-0.024	6.31%***
		S.E.	0.005	0.005		0.008	0.008		0.008	0.008	
	Rank-weighted headcount		2.63%	3.07%	16.73%***	2.85%	3.32%	16.69%***	1.76%	2.00%	13.79%
Overshoot	**Overshoot**	Mean	1.98%	2.48%	25.42%***	2.24%	2.83%	26.42%***	1.02%	1.28%	25.59%***
		S.E.	0.004	0.004		0.005	0.006		0.364	0.321	
	CI	Mean	-0.035	-0.043	21.31%***	-0.058	-0.070	20.67%***	-0.022	-0.024	7.0%***
		S.E.	0.013	0.014		0.024	0.026		0.008	0.009	
	Rank-weighted overshoot		2.05%	2.59%	26.32%	2.37%	3.03%	27.86%	1.04%	1.31%	25.78%
MPO	**MPO**	Mean	76.78%	82.54%	7.50%***	79.83%	86.40%	8.23%***	59.50%	65.76%	10.52%***
		S.E.	0.141	0.133		0.175	0.165		0.274	0.250	
	MPO incidence	N	150	175	16.67%***	113	132	16.81%***	22	25	13.64%***

Note: $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***

Table 5. Health payment-induced poverty measures (gross and net of different inpatient cost categories)

				Gross health payments	Net inpatient OOP costs	Net inpatient OOP costs + non-medical costs	Relative difference		
				(a)	(b)	(c)	((d)-(a))/(a)	((e)-(a))/(a)	((c)-(b))/(b)
Whole population (N = 5,329)	$1.90 per day poverty line	Poverty headcount	Mean	14.04%	15.02%	15.28%	6.97%***	8.80%***	1.71%***
			S.E.	0.0	0.0	0.0			
		Poverty gap (¥)	Mean	277.6	400.2	436.9	44.15%***	57.35%***	9.16%***
			S.E.	10.8	38.2	42.4			
		Mean positive gap (¥)	Mean	1977.0	2664.1	2859.2	34.76%***	44.62%***	7.32%***
			S.E.	42.4	240.6	263.1			
	The Chinese National Poverty Line	Poverty headcount	Mean	5.99%	6.70%	0.0691845	11.75%***	15.47%***	3.33%***
			S.E.	0.0	0.33%	0.0			
		Poverty gap (¥)	Mean	65.9	169.7	200.675	157.44%***	204.40%***	18.24%***
			S.E.	4.0	35.9	40.1			
		Mean positive gap (¥)	Mean	1100.3	2534.8	2900.575	130.37%***	163.61%***	14.43%**
			S.E.	35.6	522.5	562.6			
Rural population (N = 4038)	$1.90 per day poverty line	Poverty headcount	Mean	17.21%	18.36%	18.58%	6.64%***	7.94%***	1.22%***
			S.E.	0.0	0.0	0.0			
		Poverty gap (¥)	Mean	343.4	478.6	505.4	39.39%***	47.21%***	5.61%***
			S.E.	14.3	50.0	52.9			
		Mean positive gap (¥)	Mean	1994.7	2607.4	2720.5	30.71%***	36.38%***	4.34%***

			S.E.	45.9	258.1	270.1			
	The Chinese National Poverty Line	**Poverty headcount**	**Mean**	7.38%	8.22%	0.0842027	11.45%***	14.14%***	2.42%***
			S.E.	0.0	0.43%	0.0			
		Poverty gap (¥)	**Mean**	81.9	194.8	215.7332	137.96%***	163.49%***	10.73%***
			S.E.	5.4	47.1	49.9			
		Mean positive gap (¥)	**Mean**	1109.9	2369.7	2562.07	113.52%***	130.85%***	8.12%*
			S.E.	38.6	559.3	578.4			
Urban population (N = 1291)	**$1.90 per day poverty line**	**Poverty headcount**	**Mean**	4.76%	5.39%	5.70%	13.11%***	19.67%***	5.80%***
			S.E.	0.0	0.0	0.0			
		Poverty gap (¥)	**Mean**	94.9	175.6	252.1	85.00%	165.56%*	43.55%
			S.E.	13.9	67.3	92.2			
		Mean positive gap (¥)	**Mean**	1993.5	3260.4	4423.8	63.55%	121.91%	35.68%
			S.E.	151.5	1196.9	1692.6			
	The Chinese National Poverty Line	**Poverty headcount**	**Mean**	2.19%	2.42%	0.0273224	10.71%*	25.00%***	12.90%***
			S.E.	0.0	2.19%	0.0			
		Poverty gap (¥)	**Mean**	21.1	92.9	164.6699	339.88%	679.54%	77.22%
			S.E.	4.8	64.2	88.7			
		Mean positive gap (¥)	**Mean**	966.4	3839.7	6026.917	297.31%	523.63%	56.96%
			S.E.	125.4	2604.4	3129.5			

Note: $p < 0.1$ *, $p < 0.05$ **, $p < 0.01$ ***

Figure 1. Effect of different inpatient costs on Pen's Parade of the household expenditure distribution for rural populations

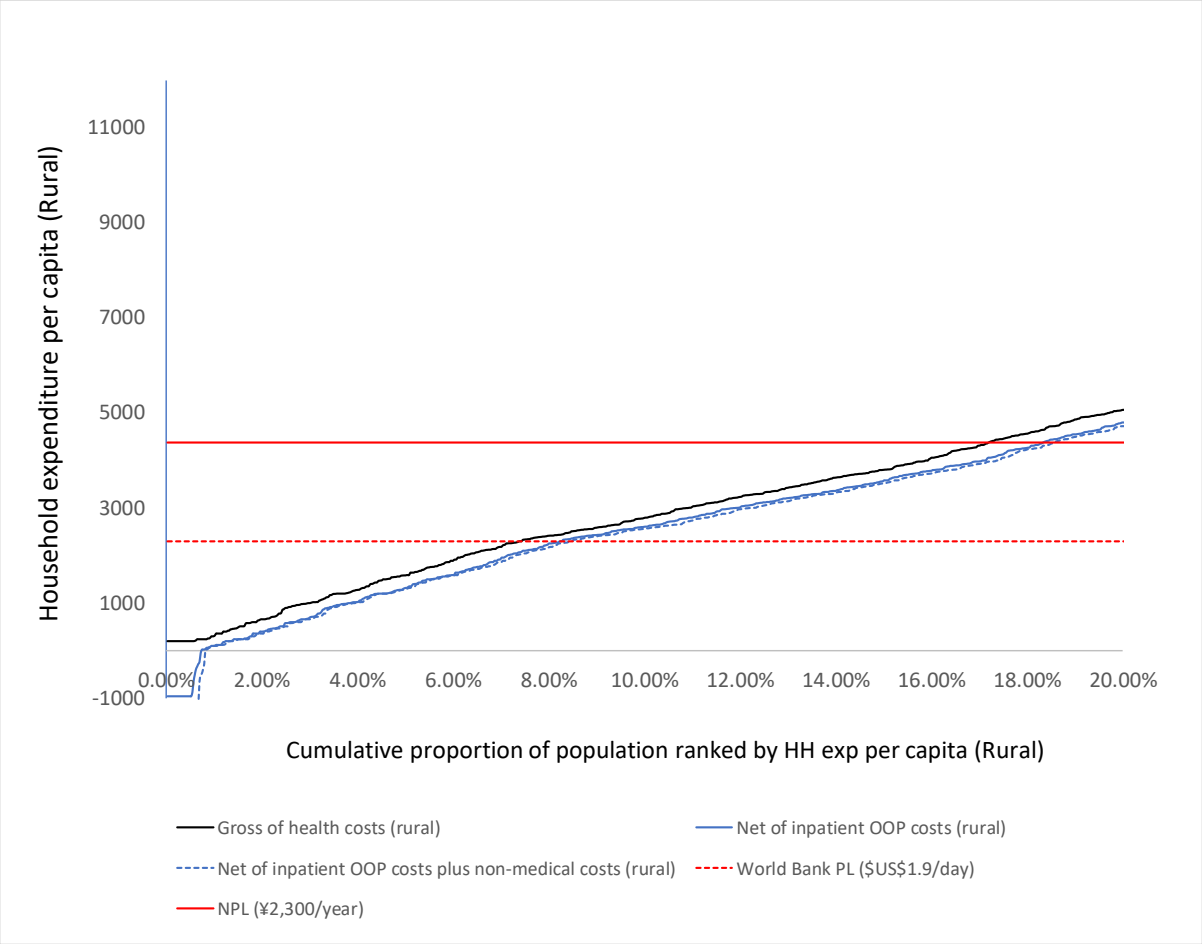

Figure 2. Effect of different inpatient costs on Pen's Parade of the household expenditure distribution for urban populations